CHAPTER 1

INTRODUCTION

1.1 Project Background

Suspension system is one of the most important and basic systems in a vehicle. The major purpose of any vehicle suspension system is to maximize the friction between the road surface and the tires to provide the stability steering and good handling of the vehicle. To achieve the stability and rides comfort, there were three important principles must be resolved which is road isolation, road handling and cornering. Numerous studies have been conducted in other to achieve stability and rides comfort.

Vehicle suspension system consists of 3 elements which are wishbones, spring and the shock absorber [1]. These 3 elements are to filter and transmit forces exerted between the vehicle body and the road. The spring is important as it carries the body mass and isolates the vehicle form uneven road surface. This contributes to drive comfort. Furthermore, damper system also contributes to safety as it absorbs the damping of the body and wheel oscillations.

1.2 Problem Statement

Most of the spring fail is due to the fatigue, in other word, they have sustained much compression-extension cycle, which causes the metal to become brittle and then breaks. If the amplitude of these cycles is large, the fatiguing process is accelerated [2]. Springs tend to be highly stressed because they are designed to fit into small spaces with the least possible weight and lowest material cost. At the same time they are required to deliver the required force over a long period of time. The reliability of a spring is therefore related to its material strength, design characteristics, and the operating environment [3]. The same goes for the car suspension spring whereby after some period of time, the car spring will have irregular and unstable stiffness. To overcome this problem, this research investigates the different parameters of an automotive suspension spring that affect the static characteristic (displacement)

1.3 Project Objectives

- To investigate a static mathematical model for helical spring with variable design parameters.
- To create a finite element analysis (FEA) model of the spring and simulate the model using variable design parameters.
- Fabricate and setup an experimental apparatus to collect the spring static displacement-force data, and to verify the actual experimental test with simulation results.

1.4 Project Scope

This project is focused on study the different parameter of the spring that will effect on the static characteristic of the linear spring. The purpose of the project is to compare the result from simulation software (Autodesk) with the actual result from the spring tester machine. The FEM analysis is perform in Autodesk software to define the characteristic of the spring.

1.5 Organization of Report

This thesis consists of five chapters. Chapter 2 presents the literature review while Chapter 3 discusses the methodology for the investigation. Chapter 4 presents the results from the experiment and the discussions regarding the results. Finally, Chapter 5 summarizes the study and provides recommendations for the study.